

8. Magnesium and fluorine react together to form magnesium fluoride.



(a) (i) Describe the structure of a metal such as magnesium.

a lattice of positive ions - 1M
surrounded by a sea of
delocalised electrons - 1M (2)

(ii) What is meant by the term malleable?

can be bent into different
shapes easily (1)

(iii) Explain, in terms of its structure, why magnesium is malleable.

layers of positive metal ions
can slide past each other - 1M
without breaking metallic bond - 1M (2)

(b) The atoms of fluorine in the F_2 molecule are joined by a covalent bond.

Describe how the atoms are held together by this bond.

Attraction between shared pair of
electrons - 1M
and the nuclei of both atoms (2)

(c) Give the electronic configuration of

(i) a fluorine atom

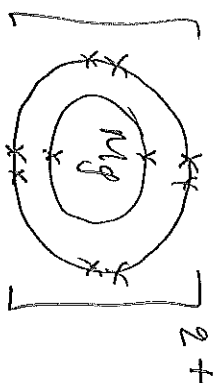
2, 7 (1)

(ii) a fluoride ion

2, 8 (2)

Leave
blank

(d) Draw a diagram to show the arrangement of electrons in a magnesium ion, showing its charge.



(2)

(e) Suggest why magnesium fluoride, MgF_2 , has a higher melting point than sodium fluoride, NaF .

The magnesium ion has a 2+ charge
whereas the sodium ion has a 1+
charge - 1M
weaker attraction between Na^+ and
 F^- than Mg^{2+} and F^- (2)

(Total 13 marks)

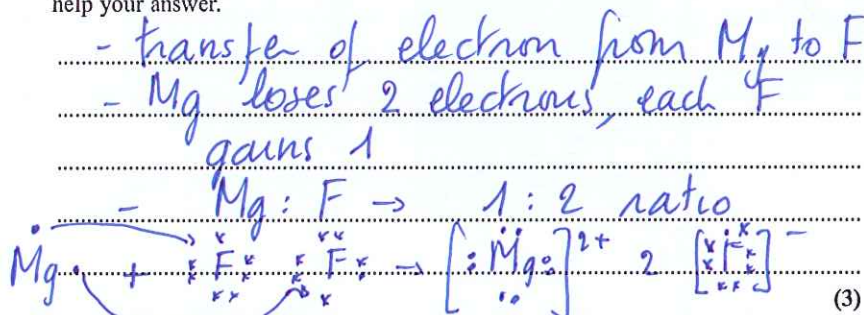
Q8

Leave
blank

4. The table gives the electronic configuration of three different atoms.

Atom	Electronic configuration
fluorine	2.7
magnesium	2.8.2
sodium	2.8.1

- (a) Describe the electron transfers that take place when magnesium reacts with fluorine to make the ionic compound magnesium fluoride, MgF_2 . You may use diagrams to help your answer.



- (b) In this reaction both oxidation and reduction have occurred. State which element has been oxidised, giving a reason.

sodium has been oxidised as it loses its valence electron (2)

- (c) (i) Give the symbols of the ions formed by sodium and fluorine.

$\text{Na}^+ \quad \text{F}^-$ (1)

- (ii) Give the formula of sodium fluoride.

NaF (1)

- (d) A flame test is carried out on separate samples of magnesium fluoride and sodium fluoride.

The magnesium fluoride does not colour the flame.

What colour do you see when the sodium fluoride is tested?

(1)

Q4

(Total 8 marks)



N 2 3 0 5 2 A 0 9 2 4

Edexcel IGCSE November 2006 Paper 2H Question 11 (slightly modified)

(This question contains material from chapter 4.)

Diamond and graphite are both forms of carbon. They both have giant covalent structures.

Both diamond and graphite have high sublimation points.

Diamond can be used for cutting.

Graphite can be used as a lubricant.

(a) Describe, without drawing a diagram, the structure of diamond. Include the number of atoms to which each carbon atom is bonded and how the atoms are arranged. Explain how this structure relates to the use of diamond in cutting.

.....

.....

.....

.....

.....

.....

(3)

(b) Describe, without drawing a diagram, the structure of graphite. Include the number of atoms to which each carbon atom is bonded and how the atoms are arranged. Explain how this structure relates to the use of graphite as a lubricant.

.....

.....

.....

.....

.....

.....

(3)

(c) Explain why both diamond and graphite have high sublimation points.

.....

.....

(2)

(Total 8 marks)

Model Answer

There may be other valid answers to some parts of this question. If you have a different answer, refer to the mark scheme to see if it is acceptable.

(a) Each carbon atom is bonded to 4 others in a tetrahedral arrangement. The strong carbon-carbon bonds in three dimensions make the diamond very hard.

(b) Each carbon atom is bonded to 3 others in layers of hexagons. There are weak forces between the layers so that the layers can slide over each other.

(c) The strong covalent bonds between the atoms need lots of energy to break them.

Mark scheme

(a)	Each C bonded to 4 others	1
	arranged tetrahedrally	1
	each C held rigidly in place/strong bonds need to be broken to deform structure	1
(b)	Each C bonded to 3 others	1
	arranged in layers of hexagons	1
	weak forces between layers/layers can slide over each other	1
(c)	strong (covalent) bonds (between atoms)	1
	need lots of energy to overcome/break	1
Total 8 marks		

Comments

This is a good example of a question where you can easily lose marks even if you know about diamond and graphite. You have to take care that your answer includes everything necessary. As always, look carefully at the mark scheme to see exactly what you needed to say.

For example, the Chief Examiner's Report said "In part (c), most of those who got as far as quoting the strong covalent bonds failed to refer to the need to break them during sublimation."

This comment covers a lot of similar cases where you can easily lose a mark by not finishing your explanation off properly. For example, if you were asked why sodium chloride had a high melting point, you would talk about the strong forces of attraction between positive and negative ions – but you need to finish by saying "which need a lot of energy to break." It's obvious, really, but don't forget to say it.